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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Integral Consulting Inc.
Suite 190
285 Century Place
Louisville CO 80027

Report Date: December 12, 2018 09:01

Project: Solvay

Account #: 20003
Group Number: 2013883
State of Sample Origin: NJ

Electronic Copy To	Integral Consulting Inc.	Attn: Glenn Esler
Electronic Copy To	Integral Consulting Inc.	Attn: Erin Palko
Electronic Copy To	Solvay	Attn: Mark Christensen
Electronic Copy To	Solvay	Attn: Mitch Gertz

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
V915 Grab Water	11/29/2018 08:00	9918924
Field Blank Grab Water	11/29/2018 08:00	9918925

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **V915 Grab Water**
Solvay

Project Name: **Solvay**

Submittal Date/Time: 11/30/2018 10:20
Collection Date/Time: 11/29/2018 08:00

Integral Consulting Inc.
ELLE Sample #: WW 9918924
ELLE Group #: 2013883
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14903	Perfluorobutanesulfonate	375-73-5	N.D.	2.7	8.9	10
14903	Perfluorodecanoic acid	335-76-2	62	8.0	18	10
14903	Perfluorododecanoic acid	307-55-1	N.D.	4.4	18	10
14903	Perfluoroheptanoic acid	375-85-9	90	3.6	8.9	10
14903	Perfluorohexanesulfonate	355-46-4	N.D.	3.6	18	10
14903	Perfluorohexanoic acid	307-24-4	35	3.6	18	10
14903	Perfluorononanoic acid	375-95-1	7,800	36	180	100
14903	Perfluoro-octanesulfonate	1763-23-1	7.8 J	3.6	18	10
14903	Perfluorooctanoic acid	335-67-1	1,000	2.7	8.9	10
14903	Perfluorotetradecanoic acid	376-06-7	N.D.	2.7	8.9	10
14903	Perfluorotridecanoic acid	72629-94-8	N.D.	3.6	8.9	10
14903	Perfluoroundecanoic acid	2058-94-8	190	3.6	18	10

Reporting limits were raised due to interference from the sample matrix.

Sample Comments

State of New Jersey Lab Certification No. PA011

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14903	NJ PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18340012	12/10/2018 20:05	Christine E Dolman	10
14903	NJ PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18340012	12/10/2018 20:14	Christine E Dolman	100
14904	NJ PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18340012	12/06/2018 14:30	Danielle D McCully	1

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Solvay

Project Name: **Solvay**

Submittal Date/Time: 11/30/2018 10:20
Collection Date/Time: 11/29/2018 08:00

Integral Consulting Inc.
ELLE Sample #: WW 9918925
ELLE Group #: 2013883
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14903	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.89	1
14903	Perfluorodecanoic acid	335-76-2	N.D.	0.80	1.8	1
14903	Perfluorododecanoic acid	307-55-1	N.D.	0.45	1.8	1
14903	Perfluoroheptanoic acid	375-85-9	N.D.	0.36	0.89	1
14903	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	1.8	1
14903	Perfluorohexanoic acid	307-24-4	N.D.	0.36	1.8	1
14903	Perfluorononanoic acid	375-95-1	1.0 J	0.36	1.8	1
14903	Perfluoro-octanesulfonate	1763-23-1	0.40 J	0.36	1.8	1
14903	Perfluorooctanoic acid	335-67-1	N.D.	0.27	0.89	1
14903	Perfluorotetradecanoic acid	376-06-7	N.D.	0.27	0.89	1
14903	Perfluorotridecanoic acid	72629-94-8	N.D.	0.36	0.89	1
14903	Perfluoroundecanoic acid	2058-94-8	N.D.	0.36	1.8	1

Sample Comments

State of New Jersey Lab Certification No. PA011

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14903	NJ PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18340012	12/10/2018 11:03	Christine E Dolman	1
14904	NJ PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18340012	12/06/2018 14:30	Danielle D McCully	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: Integral Consulting Inc. Group Number: 2013883
Reported: 12/12/2018 09:01

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	MDL** ng/l	LOQ ng/l
Batch number: 18340012	Sample number(s): 9918924-9918925		
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorodecanoic acid	N.D.	0.90	2.0
Perfluorododecanoic acid	N.D.	0.50	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.40	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18340012	Sample number(s): 9918924-9918925								
Perfluorobutanesulfonate	8.49	8.67	8.49	8.64	102	102	70-130	0	30
Perfluorodecanoic acid	9.60	8.54	9.60	8.77	89	91	70-130	3	30
Perfluorododecanoic acid	9.60	9.04	9.60	8.40	94	88	70-130	7	30
Perfluoroheptanoic acid	9.60	9.69	9.60	9.97	101	104	70-130	3	30
Perfluorohexanesulfonate	9.08	8.39	9.08	8.71	92	96	70-130	4	30
Perfluorohexanoic acid	9.60	9.96	9.60	8.66	104	90	70-130	14	30
Perfluorononanoic acid	9.60	9.69	9.60	8.49	101	88	70-130	13	30
Perfluoro-octanesulfonate	9.18	8.18	9.18	7.20	89	78	70-130	13	30
Perfluorooctanoic acid	9.60	8.80	9.60	9.47	92	99	70-130	7	30
Perfluorotetradecanoic acid	9.60	9.59	9.60	9.95	100	104	70-130	4	30
Perfluorotridecanoic acid	9.60	8.98	9.60	8.74	94	91	70-130	3	30
Perfluoroundecanoic acid	9.60	7.92	9.60	8.75	83	91	70-130	10	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Integral Consulting Inc. Group Number: 2013883
Reported: 12/12/2018 09:01

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: NJ PFAS in Water by LC/MS/MS
Batch number: 18340012

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
9918924	85	79	77	80	76	82
9918925	92	90	80	84	91	92
Blank	85	86	82	89	88	84
LCS	85	93	87	92	95	86
LCSD	85	90	81	85	89	90
Limits:	26-148	35-138	34-126	35-126	48-122	50-121

	13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoDA	13C2-PFTeDA
9918924	78	81	94	78	91
9918925	99	96	97	87	89
Blank	93	86	89	89	79
LCS	97	96	105	93	90
LCSD	97	91	89	89	81
Limits:	41-144	47-125	30-128	39-130	26-119

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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For Eurofins Lancaster Laboratories Environmental use only

Acct. # 21003 Group # 2013883 Sample # 9918924-25

COC # 570576

Client Information

Client: Solvay | Acct. #:

Project Name/#: | PWSID #:

Project Manager: Mitch Gertz | P.O. #:

Sampler: M. Christensen | Quote #:

State where samples were collected: NJ | For Compliance: Yes ☒ No ☐

Matrix

Soil ☐ Sediment ☐ Tissue ☐ | Water ☐ Potable ☐ Ground ☐ NPDES ☒ Surface | Other: ____

Analysis Requested

Preservation and Filtration Codes

For Lab Use Only

FSC: | SCR#: 234993

Preservation Codes

H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 P=H_3PO_4
F=Field Filtered O=Other

Remarks

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Total # of Containers	PFAA
9915	11/29/18	0800	X			X	2	X
Field Blank	11/29/18	0800	X			X	1	X

Turnaround Time (TAT) Requested (please circle)

Standard | Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Requested TAT in business days: ____

E-mail address: mark.christensen@solvay.com

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent/non-CLP) | Type VI (Raw Data Only)

Type III (Reduced non-CLP) | NJ DKQP | TX TRRP-13

NYSDEC Category A or B | MA MCP | CT RCP

	Date	Time		Date	Time
Relinquished by: Richard Rutt	11/29/18	10:30	Received by:	11/27/18	1400
Relinquished by:	11/29/18	1430	Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by: Chad	11-30-18	1020

EDD Required? Yes / No

If yes, format: ____

Site-Specific QC (MS/MSD/Dup)? Yes / No

(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier: UPS ____ FedEx X Other ____

Temperature upon receipt 3.3 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 234644

Group Number(s): 2013883

Client: Solray

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	11/30/2018 10:20
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NJ		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Christopher Stief (12429) at 13:26 on 11/30/2018

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	3.3	DT	Wet	Y	Bagged	N

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.